

The Realities of Satellite Broadband

Ken Pfister, Great Plains Communications

Wendy Thompson Fast, Consolidated Companies

Larry Thompson, Vantage Point Solutions

High-Quality Broadband Is Becoming a Necessity

Characteristic	Consumer Demand	Applications Impacted
High Speed	<ul style="list-style-type: none">• Median Speeds higher than 65 Mbps in 2017• By 2020, 1 Gbps will be commonly available	eHealth, distance education, VPNs, interactive applications, gaming, Internet of Things
Low Latency	<ul style="list-style-type: none">• FCC standard of 100 ms or less• Terrestrial network latencies are 12 to 58 ms	Interactive applications, distance education, video conferencing, Internet of Things
High Capacity	<ul style="list-style-type: none">• FCC minimum is 160 GB/mo for support programs and will increase• 190 GB/mo average in 2015; today usage is much higher	Video-based applications, eHealth, distance education, online backups, gaming
High Reliability	<ul style="list-style-type: none">• Today, customer health and security often rely on broadband	Public safety, healthcare, and commerce
Economical and Scalable	<ul style="list-style-type: none">• Network must cost-effectively scale to meet increasing customer demand	All applications

Both GEO and LEO Satellites Have Difficulty Meeting Customers' Needs

Geostationary (GEO) Satellites

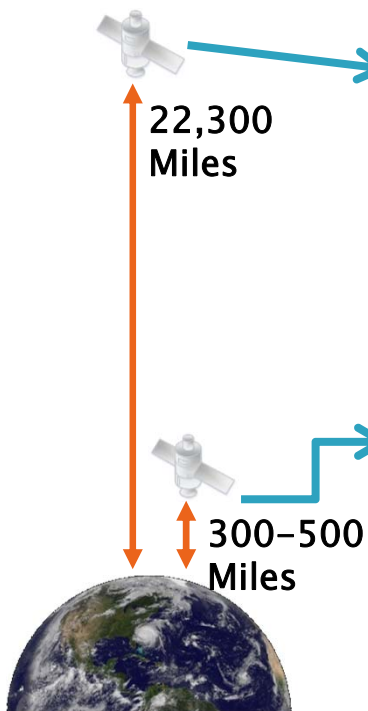
- Effective at broadcasting to multiple locations simultaneously , but less effective for interactive applications when low latency is critical
- Latency of 599 ms–629 ms (20 times greater than landline broadband); Twice the delay for “Double Hop” situations
- Solar interference during a multiple day period causes outages, sometimes in excess of 15 minutes

Low Earth Orbit (LEO) Satellites

- Hundreds or thousands of satellites are required to provide coverage, making the initial cost high
- Billions of dollars of ongoing investments are required to replace satellites with a life span of 5–7 years
- Past launch attempts have not proven commercially successful
- Complex hand-offs between satellites are required
- Delays have extended the deployment timeframe

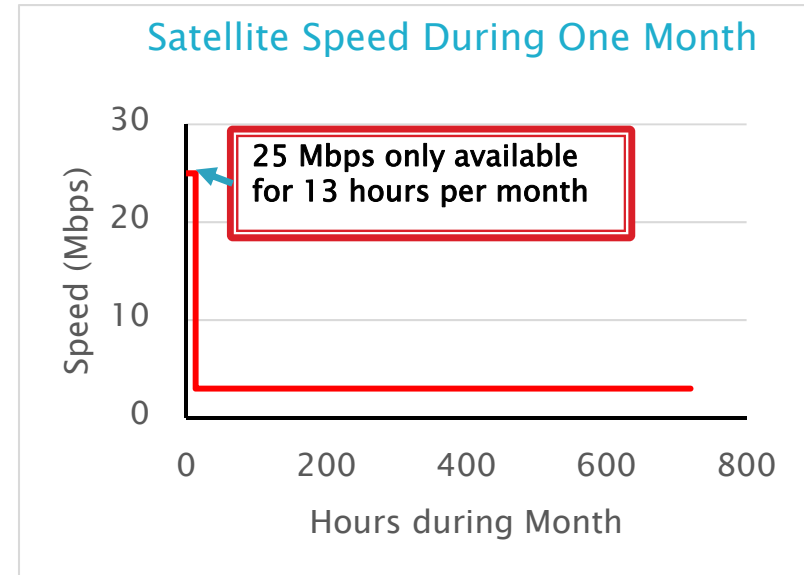
Both GEO and LEO Satellites

- Spectrum is limited so it must be reused to increase capacity
- Satellite frequencies are susceptible to weather degradation



Advertised Speed Is Only Available for Limited Portion of the Month

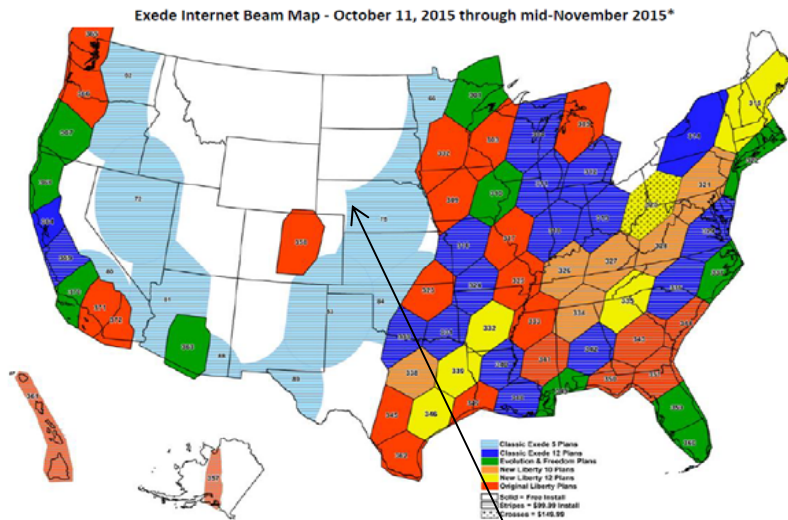
Provider	Data Threshold (GB/month)	Initial Speed (Mbps)	Speed above Data Threshold (Mbps)	Effective Speed (Mbps)
Hughes	10	25	3	4.2
	20	25	3	5.3
	30	25	3	6.5
	50	25	3	8.8
ViaSat	12	12	3	3.6
	18	12	3	3.9
	150	12	3	10.1



- ▶ Satellite speeds are reduced once customers exceed data thresholds, which are *much* lower than average usage levels
 - Most data thresholds are a fraction of the average customers' usage, estimated to be 190 GB/month
 - The advertised speed is available for less than 2% of the month
- ▶ The *best* satellite speeds are lower than the *worst* urban wireline speeds

The weighted average speed is calculated as follows: $[\text{Speed Below the Data Threshold} * \text{Data Threshold} + \text{Speed Above the Data Threshold} * (190 \text{ GB} - \text{Data Threshold})] / 190 \text{ GB}$

Satellite's Spotty Capacity Is Particularly Lacking in Western States



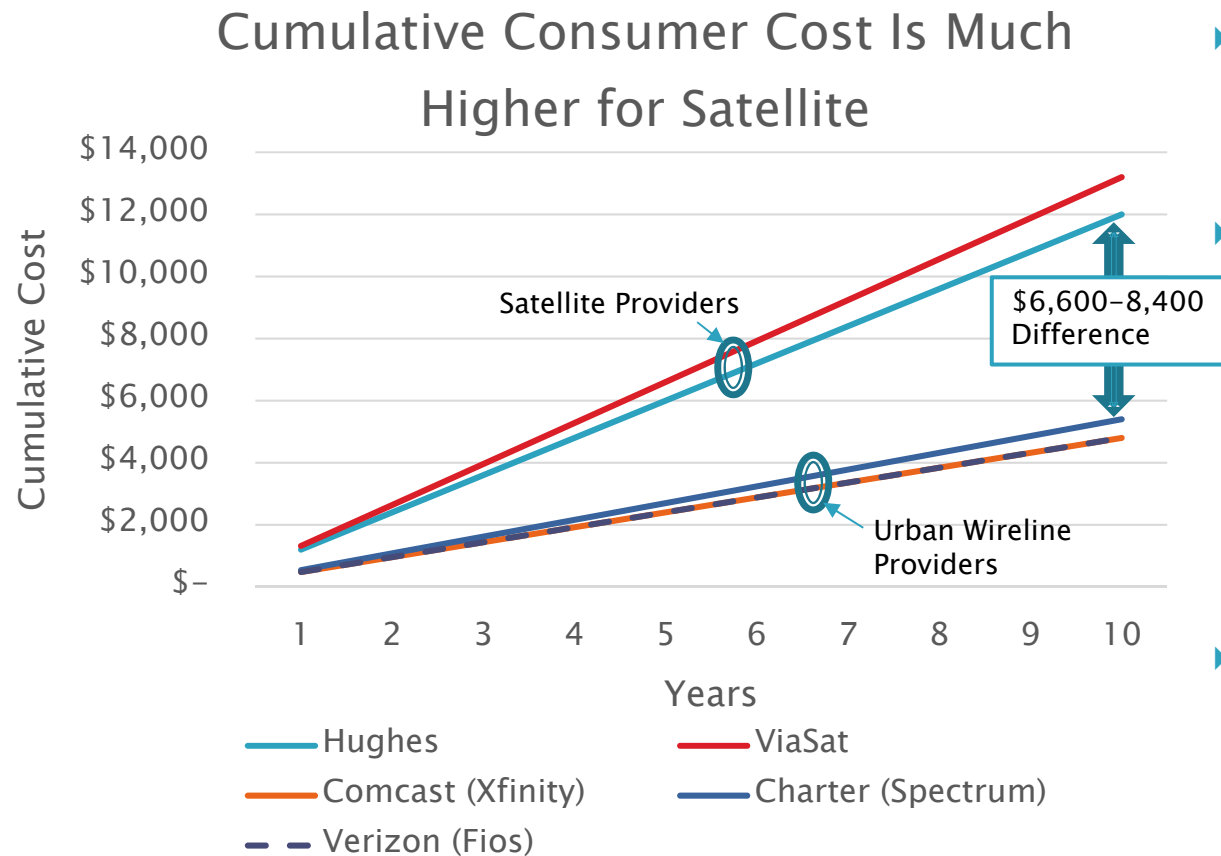
Note: Additional Exede satellites have not been placed in service since the date of this map.

ViaSat is not accepting new customers

- ▶ One next generation satellite has the capacity to serve
 - 60,000 customers, or less than 0.06% of the US households, subscribing to a 25 Mbps plan*
 - 300 customers simultaneously using a 1 Gbps plan, which is commonly available in urban areas
- ▶ Combined, Hughes and ViaSat have 730 Gbps of capacity
 - Each customer could only use 430 kbps simultaneously
 - Only 9% of their 1.7 million customers could watch an HD movie simultaneously

*Assuming an oversubscription ratio of 5:1

Satellite Customers Pay More for Less



- ▶ A satellite consumer pays \$6,600 to \$8,400 more over 10 years than does a wireline customer
- ▶ Satellite consumers receive lower quality broadband
 - Lower speeds (Half the median US speed)
 - Lower data capacity (Five times lower than wireline plans)
 - High Latency
 - Less reliability
- ▶ In many cases, the cost difference could pay for a better quality, more scalable terrestrial-based broadband network

As Many Locations as Possible Should Receive Terrestrial Broadband Service

- ▶ FCC should be realistic when considering the claims of the satellite industry
- ▶ The FCC should not be influenced by claims that cannot be backed in the marketplace
 - We will assist the FCC in conducting a trial comparing terrestrial and satellite broadband in real-world applications
- ▶ FCC should increase funding for RoR broadband
 - A-CAM should be funded to at least \$200/location
 - A decision by 12/31/17 will lock in carriers' commitments to serve tens of thousands of new locations

